

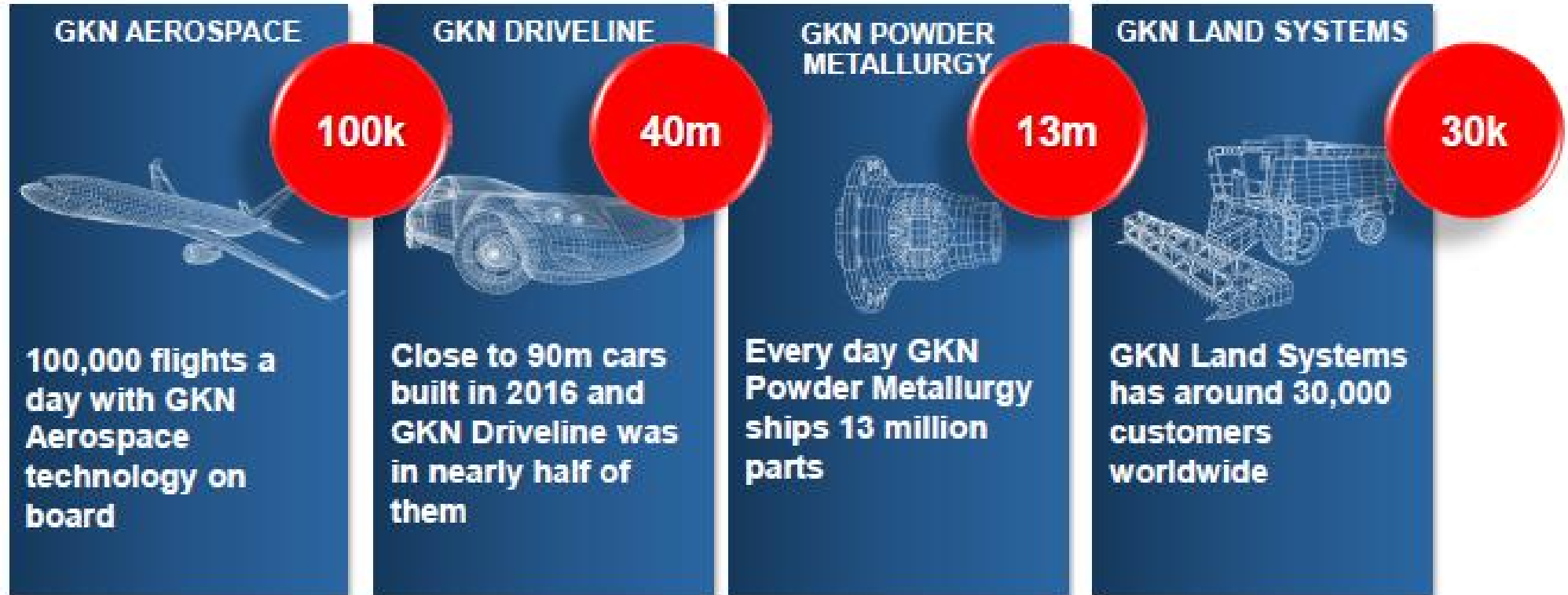
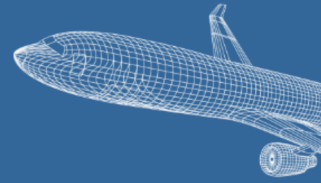
Den industriella digitaliseringskedjan

Henrik Runnemalm, Forskningschef, GKN Aerospace Engine Systems

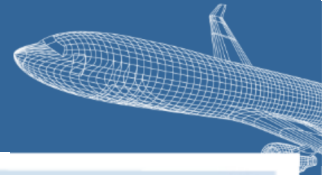


GKN TECHNOLOGY:
MAKING THINGS FLY

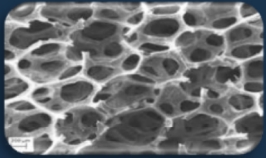
This is what we do



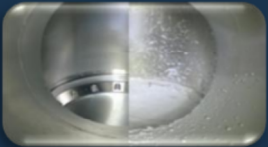
The Widest Range of Technologies



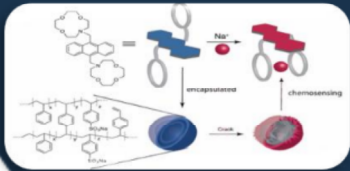
Chemistry & Materials



Erosion Coatings



Anti-Ice Coatings

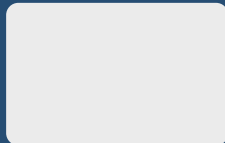


Damage Detection Coatings



High temperature Materials

Processes



Near Net Shaping

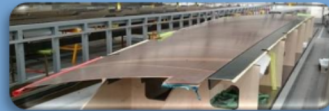


Additive Manufacturing



Forming & Welding

Major Components



Co-Cured Wing Covers



Cutting edge canopies



Composite Automation

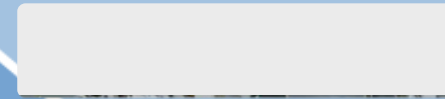


Automated Polishing

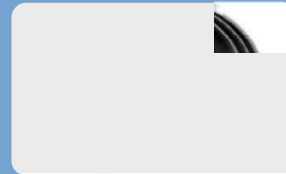
Major assemblies



Composite Fuselages



Trailing Edge Assemblies



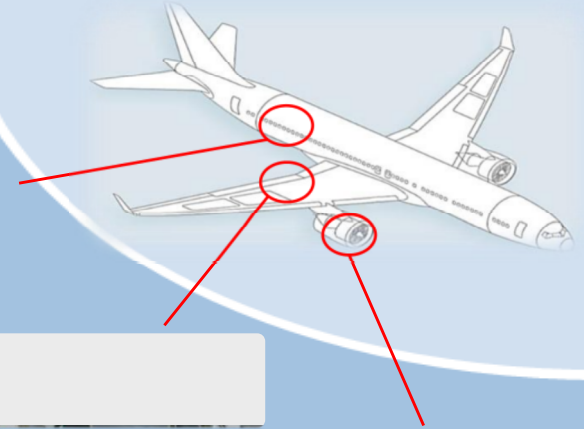
Composite Fan Cases



Laser Welded Structures



Space Propulsion Structures

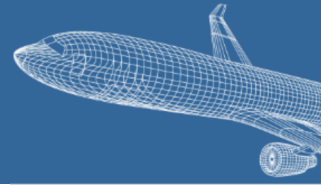


Engine certification

GKN Aerospace combining technologies to offer unique products



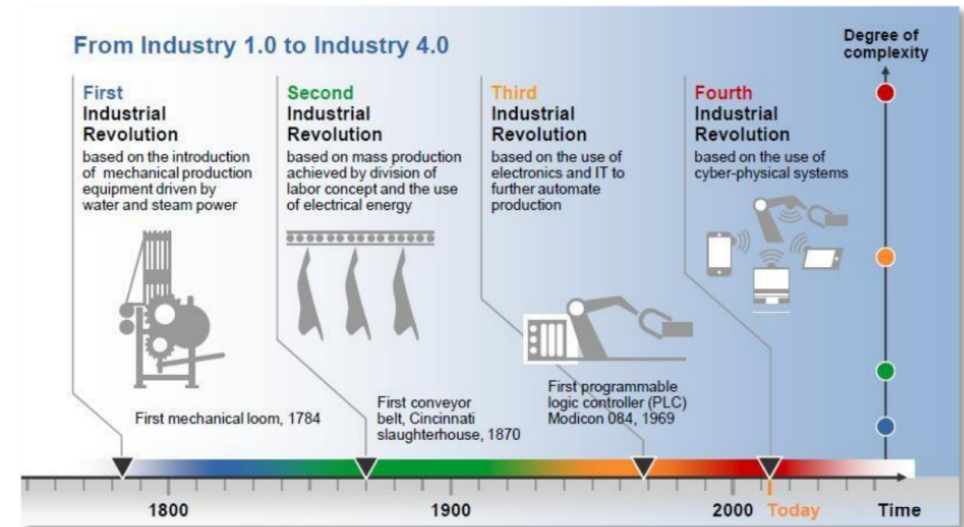
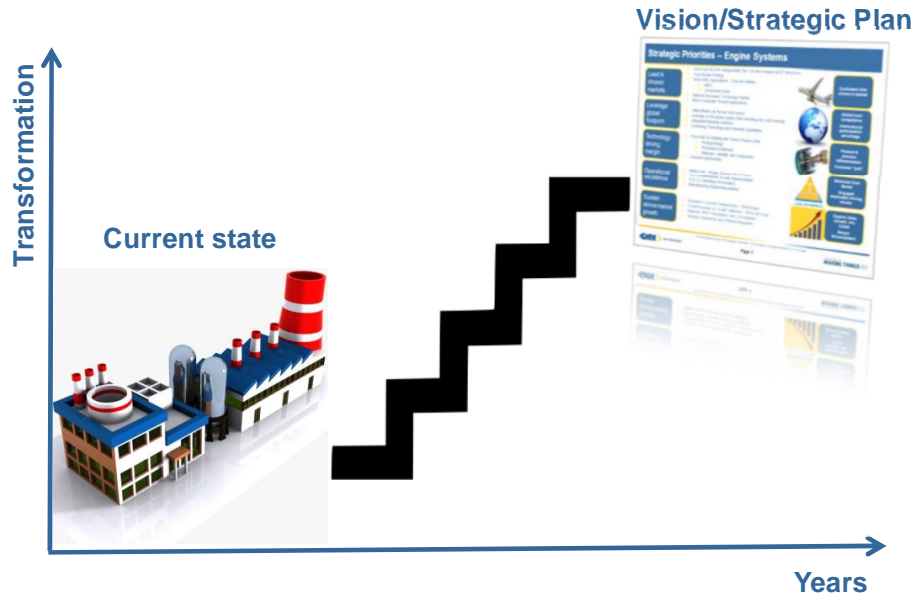
Journey from current state to wanted position

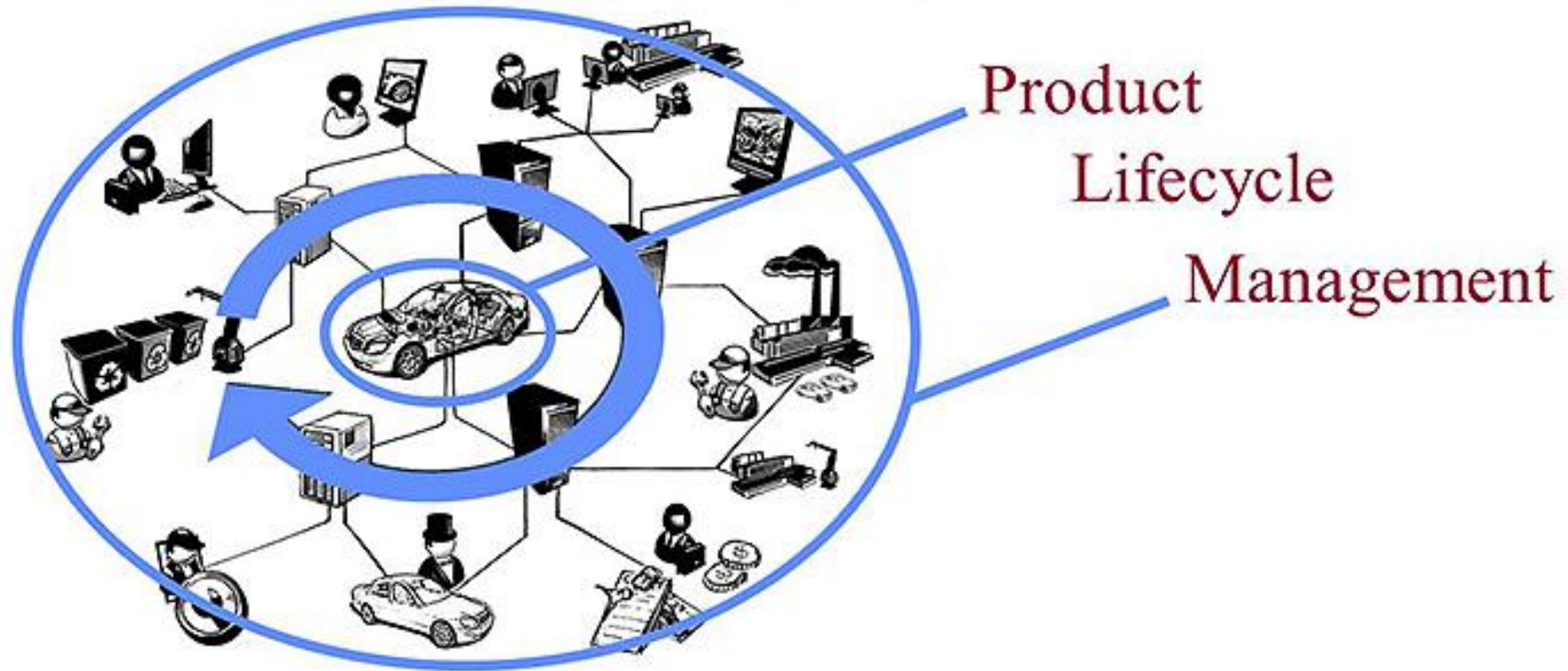
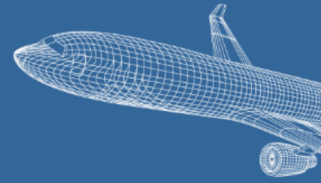


Do we have a good understanding of what's needed to stay competitive?

What steps do we need to take to move forward to meet our strategic plans?

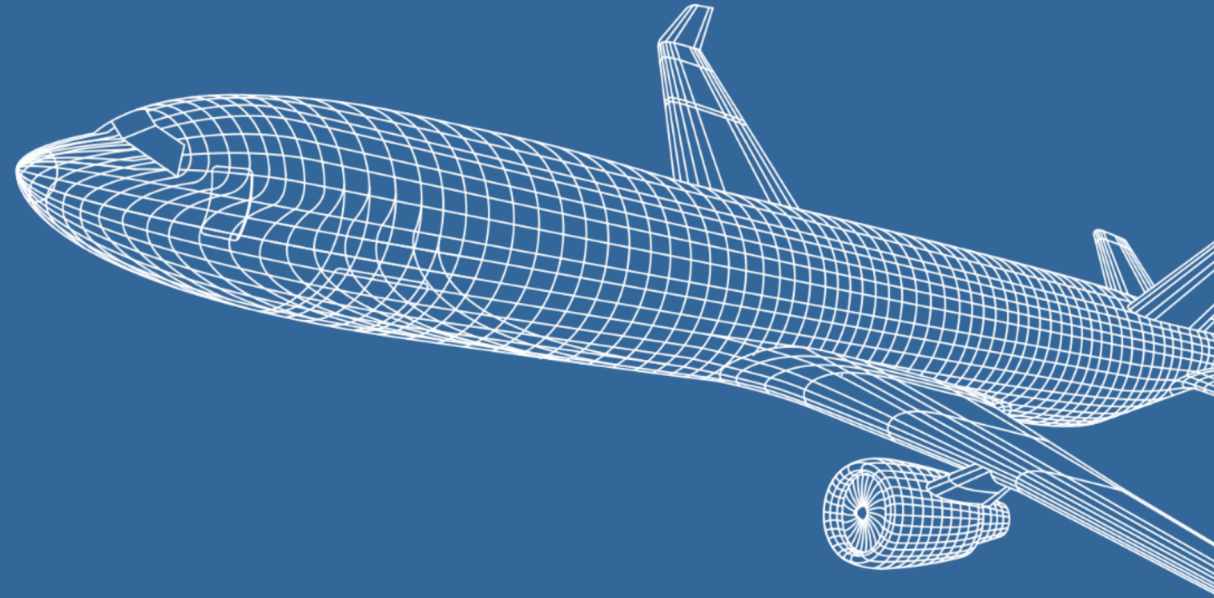
Where is the manufacturing industry heading?





Source: Chalmers System Engineering & PLM



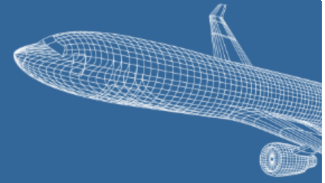


Giving some examples



GKN TECHNOLOGY:
MAKING THINGS FLY

Providing the tools and systems is necessary



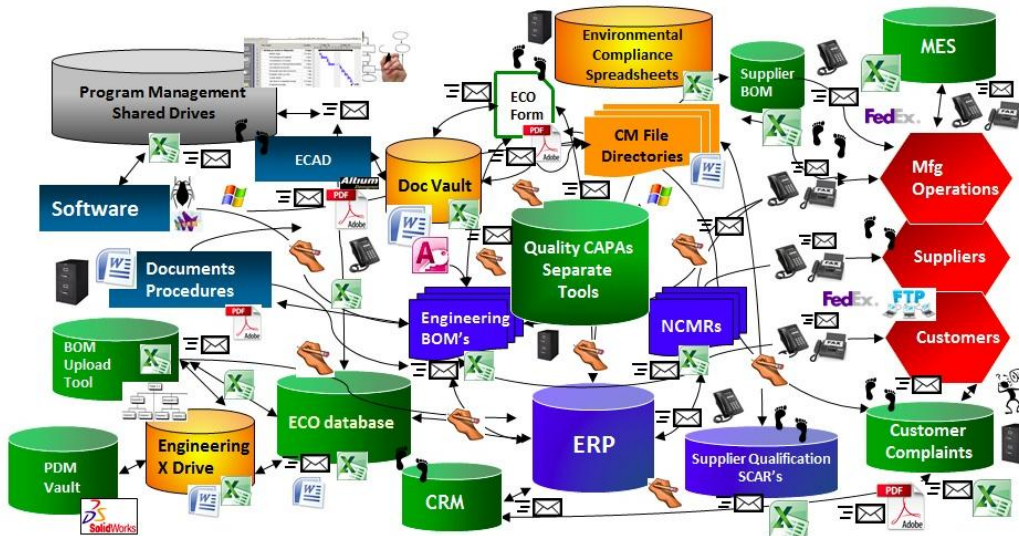
- All product definitions has to fulfill design intent
- All manufacturing has to be traceable to its source
- All product use has to be logged and stored
- All PRODUCT DATA has to be maintained and available

40 years

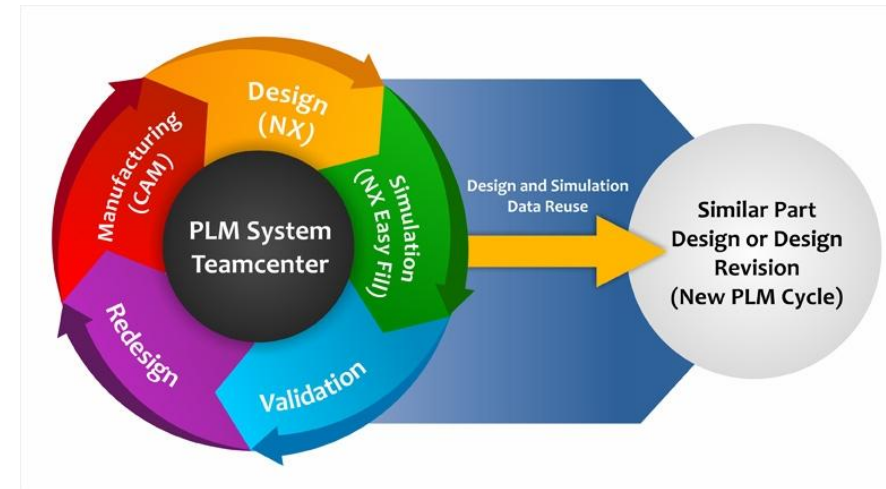
Aviation is the branch of engineering that is least forgiving of mistakes.

Freeman Dyson

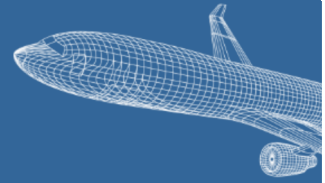
“What could possibly go wrong” – Quite a lot actually!



Data management process



Illustrating multidisciplinary optimization



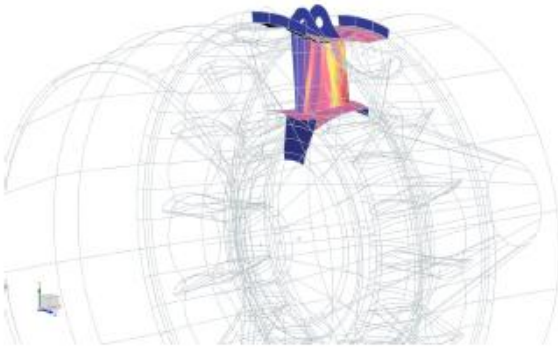
• Object Oriented Design

- enabling functional trade offs

• Design Space Exploration

- enabled through design automation and big data analytics

Advances in computer aided engineering support technology integration



Aero performance

- Pressure loss
- Swirl

TRF weight:

Strength

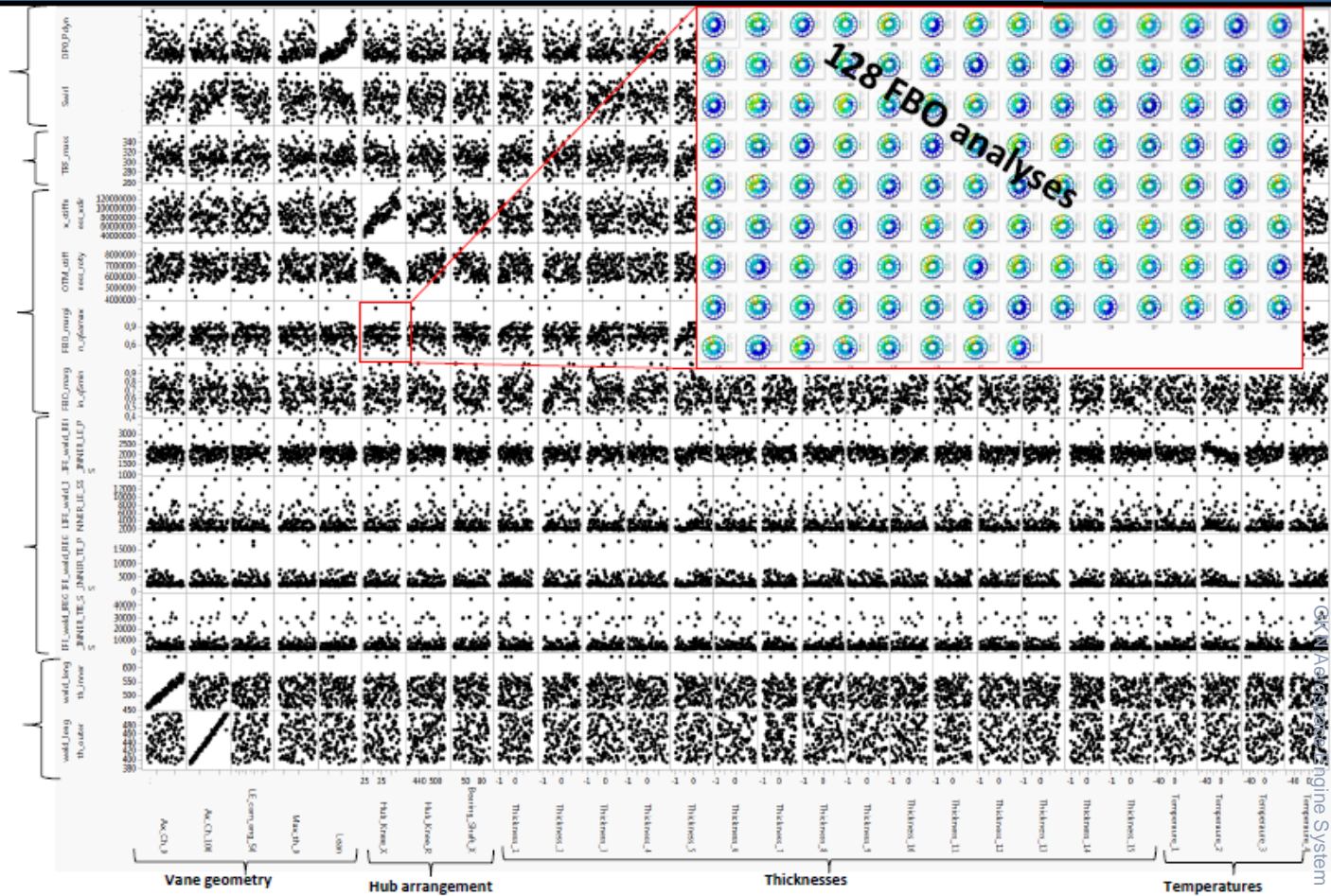
- FBO margin
- Stiffness

Life

- Weld life

Producability

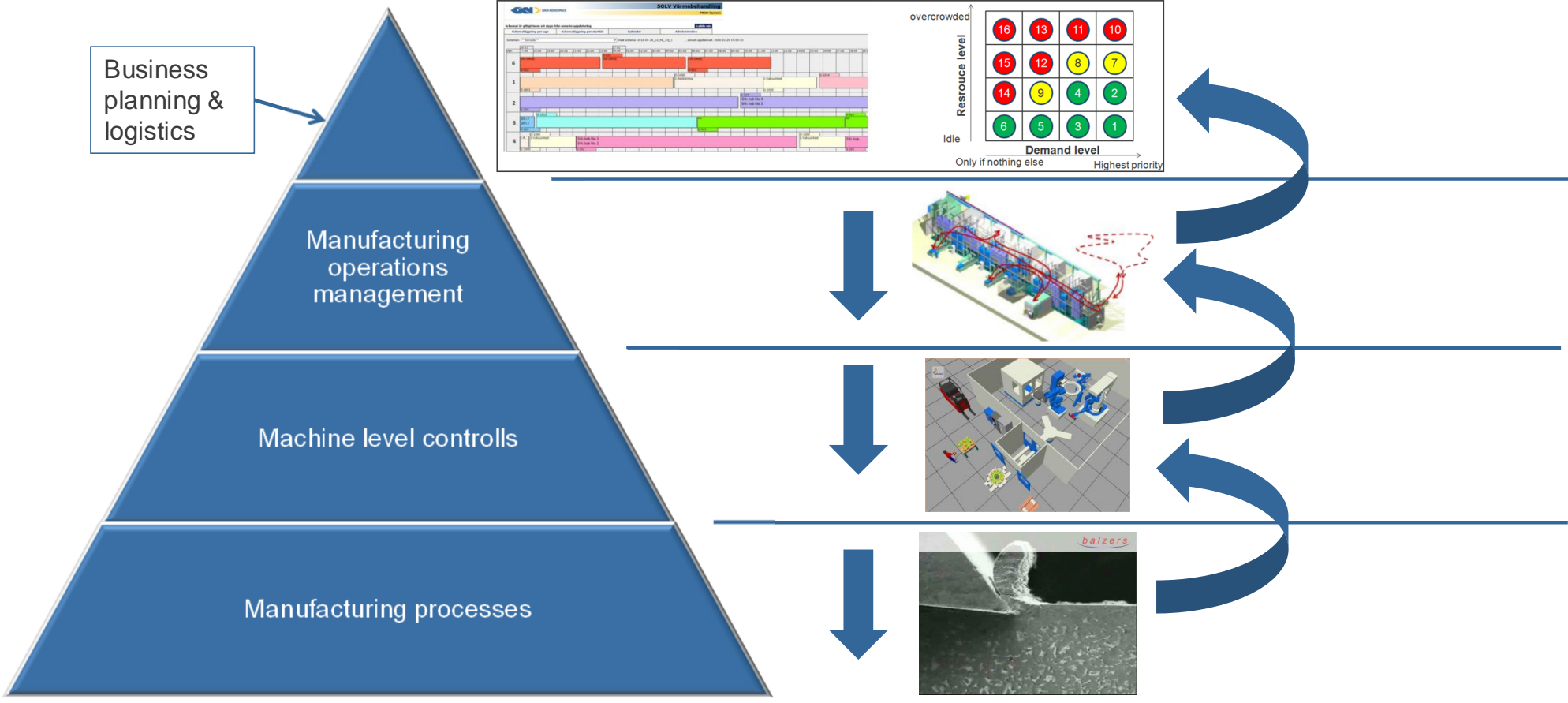
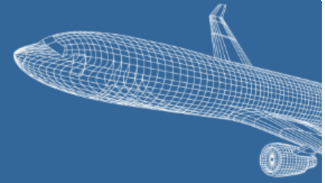
- Weld length



GT Aero Engine System

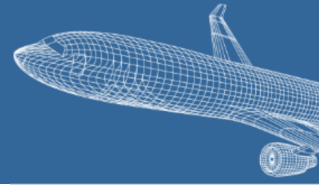


Different level of data



11155 Rev.1

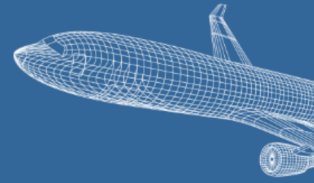




- > KPS is a system developed at GKN Aerospace Sweden for
 - > collection of inspection and process data
 - > making process robustness analysis
- > The aim with the system is to, based on statistics from reported data,
 - > graphically present data
 - > determine the level of the continuous sampling plan
 - > perform analyses to find problem areas
 - > follow up of improvement work and create feedback to design

The data speaks for itself. I respect everyone's opinion, but we make decisions based on facts, not opinions.

Carol Todd

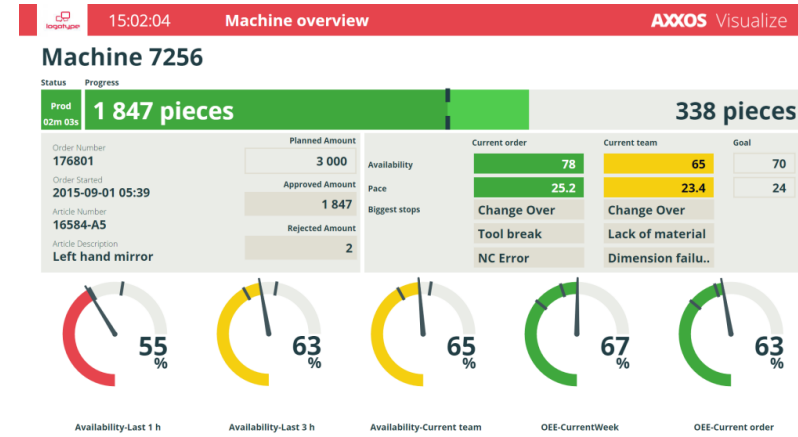


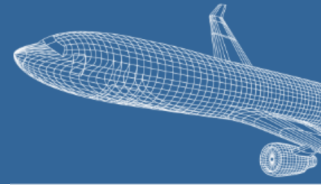
Why?

> to utilize each machine (asset) as efficient as possible

Six Major Losses

- > Breakdowns and Failures
- > Setup and Adjustments
- > Small Stops
- > Reduced Speed
- > Start-up Rejects (Quality Loss)
- > Production Rejects (Quality Loss)

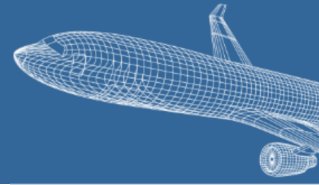




In the end, no matter what tools, systems, technologies we introduce in order to improve our business, everything comes down to the competence of our people



What do we need



- 1. We need to develop analysis methods and decision support based on the Ind. 4.0 architecture to gain resource efficiency at all levels**
- 2. We need to support regulatory framework and standardization**
- 3. We need to better understand safety and security aspects**
- 4. A reference architecture to continuously demonstrate Ind 4.0**
 - 1. We need to provide Training and continuing professional development**
 - 2. Introduce new technology as it is matured**
- 5. Better understand future work organization and design**





Thank you